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[Title Of The Invention]
PGA TYPE SEMICONDUCTOR DEVICE AND MANUFACTURING METHOD THEREOF

[Abstract]
PURPOSE: To increase the junction strength of pins in relation to the title PGA semiconductor device.
CONSTITUTION: The PGA type semiconductor device is provided with numerous pins 14 bonded onto pads 18, the other numerous pins 14 formed on the rear surface of a substrate 11 and an epoxy resin-made coating film 31 formed also on the rear surface of the substrate 11 using the substrate 11, a bare LSI 12 and a silver paste made bonding part 19. At this time, the coating films 31 covering the root part of the pins 14 fill the role of reinforcing the fixation of the pins 14.

[Claim(s)]
[Claim 1]A PGA semiconductor device having composition characterized by comprising the following.
A substrate (11) which has a pad (18) on the undersurface (32).
A semiconductor part (12) mounted in the upper surface of this board.
A pin (14) of a large number which have joined to the above-mentioned pad of the undersurface of this board with a jointing material, have electrically connected with this semiconductor part, projected below and have been located in a line from this substrate.
An enveloping layer (31) made of a synthetic resin which has wrap thickness for a portion of a root of each above-mentioned pin, covers a portion of a root of each of this pin, and has been formed in the undersurface of the above-mentioned substrate and which has insulation.
[Claim 2]A PGA semiconductor device having composition characterized by comprising the following.
A substrate body (11a).
A thin film multilayer interconnection layer of the upper surface of this substrate body (11b).
A substrate (11) which consists of a pad (18) of the undersurface of this substrate body.
Two or more semiconductor parts (12) mounted on this thin film multilayer interconnection layer of this board, A pin (14) of a large number which have joined to the above-mentioned pad of the undersurface of this board with a jointing material, have electrically connected with this semiconductor part, projected below and have been located in a line from this substrate, An enveloping layer (31) made of a synthetic resin which has wrap thickness for a portion of a root of each above-mentioned pin, covers a portion of a root of each of this pin, and has been formed in the undersurface of the above-mentioned substrate and which has insulation.
[Claim 3]The PGA semiconductor device according to claim 1 or 2, wherein the above-mentioned enveloping layer has composition which is a product made of thermosetting

synthetic resin.
[Claim 4]A manufacturing method of a PGA semiconductor device having composition characterized by comprising the following.
A process of mounting a semiconductor part in the upper surface of a substrate (50, 50A).
A pin process which arranges many pins in the undersurface of this substrate, is joined to it, and is stood to it (52, 52A).
An enveloping layer formation process which forms an enveloping layer made of a synthetic resin which has a portion of a root of each above-mentioned pin on the undersurface of the above-mentioned substrate to which this pin was joined, and has insulation in wrap thickness (53, 53A).
[Claim 5]A manufacturing method of a PGA semiconductor device having composition characterized by comprising the following.
A process of mounting a semiconductor part in the upper surface of a substrate (50, 50A).
A pin fixing process which arranges many pins in the undersurface of this substrate, is joined to it, and is stood to it (52, 52A).
An enveloping layer formation process which forms an enveloping layer made of thermosetting synthetic resin which has a portion of a root of each above-mentioned pin on the undersurface of the above-mentioned substrate to which this pin was joined, and has insulation in wrap thickness (53, 53A).
[Claim 6]A manufacturing method of the PGA semiconductor device according to claim 5 characterized by comprising the following.
A sheet set process of making a sheet made of thermosetting synthetic resin (61) which considers the above-mentioned enveloping layer formation process (53) as direction to which flip vertical of the substrate to which the above-mentioned pin was joined was carried out, and has a hole (60) corresponding to the above-mentioned pin fitting into a pin, and placing this hole for it on the undersurface of the above-mentioned substrate (53_{-1}).
A process heated in order to dissolve a sheet which was placed as for the account of the upper and also to make it harden (53_{-2}).
[Claim 7]A manufacturing method of the PGA semiconductor device according to claim 5 characterized by comprising the following.
A process of the above-mentioned enveloping layer formation process (53A) considering the above-mentioned substrate to which the above-mentioned pin was joined as direction which carried out flip vertical, and forming a dam in the circumference of the undersurface of the above-mentioned substrate ($53A_{-1}$).
A process of slushing a thermosetting liquid-like synthetic resin on the undersurface of the above-mentioned substrate with which the above-mentioned dam was formed ($53A_{-2}$).
A process heated in order to stiffen slushed thermosetting synthetic resin ($53A_{-3}$).

[Detailed Description of the Invention]
[0001]
[Industrial Application]This invention relates to a PGA semiconductor device and a manufacturing method for the same.
[0002]PGA (PiN Grid Array) In a type semiconductor device, power acts on a pin in the time of the insertion and extraction to the socket at the time of the examination after manufacture, and mounting to the printed circuit board, etc. Therefore, it is needed that the

bonding strength to the substrate of a pin is sufficiently strong so that a pin may not fall out in the time of this examination and mounting, etc.

[0003]It is needed that temperature is lower than about 400 degrees C, for example when joining a pin to a substrate so that the additive layer of the upper surface of a substrate may not be damaged.

[0004]As for a PGA semiconductor device, it is desirable for a manufacturing cost to be cheap.

[0005]Therefore, also let it be requirements to be that the melting point is low and a cheap thing as a cementing material for joining a pin to a substrate.

[0006]

[Description of the Prior Art]Drawing 7 shows the conventional PGA MCM (Multi-Chip Module) semiconductor device 10 of one example.

[0007]The PGA MCM semiconductor device 10 has the pin 14 of a large number which align on the wrap lid 13 and the undersurface of the substrate 11, and project caudad two or more raise in basic wages LSI12 mounted in the upper surface of the substrate 11 and the substrate 11, and raise in basic wages LSI12 from the substrate 11, and have been set up.

[0008]The substrate 11 consists of the substrate body 11a and the additive layer 11b of the upper surface of the substrate body 11a. The additive layer 11b is indispensable for the substrate of an MCM semiconductor device.

[0009]The substrate body 11a is a product made from ceramics, and has much beer 15.

[0010]As expanded and shown in drawing 8, the additive layer 11b consists of the pattern 16 made from Cu, and the insulating layer 17 made from polyimide.

[0011]Heat-resistant temperature T_1 of polyimide is about 400 degrees C.

[0012]The pad 18 is formed in the undersurface of the substrate 11.

[0013]The pad 18 consists of the Cr/Cu/Cr pad section 18a and the Au/nickel pad section 18b of this upper part.

[0014]The pin 14 is about 10 mm in length.

It has the body part 14a and the head 14b.

[0015]The pin 14 is a product made from covar, and nickel/Au plating has been carried out.

[0016]As for path d_1 of the pin body part 14a, 0.7 mm and thickness t_1 of 0.4 mm and path d_2 of the head 14b are about 0.2 mm.

[0017]The pin 14 is soldered to the pad 18 by the jointing 19 made from silver paste. The pin 14 is electrically connected with raise in basic wages LSI12 via the beer 15 grade. If it sees about the manufacturing process of the PGA MCM semiconductor device 10, it is common to form an additive layer and to paste up a pin from the reasons of workability etc.

[0018]

[Problem(s) to be Solved by the Invention]As shown in drawing 4, the curing temperature of silver paste is about 150 degrees C, and is lower than heat-resistant temperature T_1 of polyimide.

[0019]For this reason, adhesion of the pin 14 is performed, without damaging the insulating layer 17 made from polyimide of the additive layer 11b.

[0020]However, when the pin 14 is pulled in the direction of arrow A and the pin 14 separates in the part of the jointing 19, the stress (bonding strength) which acts on the

jointing 19 is 0.5 - 1.0kgf/mm^2, and is comparatively small.
[0021]Therefore, drawing 7 and the PGA MCM semiconductor device 10 of drawing 8 had the problem that it could be easy to take the pin 14.
[0022]Here, if silver solder is used instead of silver paste as shown in drawing 4, the bonding strength of a pin will become more than 10 kgf(s)/mm^2, and if AuSn is used, the bonding strength of a pin becomes six to 7 kgf/mm^2, and can raise the bonding strength of a pin.
[0023]However, the brazing temperature of silver solder is as high as about 650 degrees C, and since it is higher than heat-resistant temperature T_1 of polyimide, the additive layer 11b will be damaged at the time of soldering.
[0024]For this reason, silver solder cannot be used.
[0025]AuSn curses, and temperature is about 350 degrees C and is lower than heat-resistant temperature T_1 of polyimide. For this reason, a pin can be soldered, without damaging the additive layer 11b.
[0026]However, the price of AuSn is high, if the number of pins uses AuSn in 100 or more and the actual condition which has increased, compared with the case where silver paste is used, the divisor of 1000 yen becomes high and the price of PGA MCM semiconductor devices is not preferred [divisor].
[0027]Then, an object of this invention is to provide the PGA MCM semiconductor device which solved the aforementioned problem.
[0028]
[Means for Solving the Problem]A substrate with which an invention of claim 1 has a pad on the undersurface, and a semiconductor part mounted in the upper surface of this board, A pin of a large number which have joined to the above-mentioned pad of the undersurface of this board with a jointing material, have electrically connected with this semiconductor part, projected below and have been located in a line from this substrate, It has composition which has wrap thickness for a portion of a root of each above-mentioned pin, covers a portion of a root of each of this pin, and has been formed in the undersurface of the above-mentioned substrate and which has an enveloping layer made of a synthetic resin which has insulation.
[0029]An invention of claim 2 A substrate body and a thin film multilayer interconnection layer of the upper surface of this substrate body, A substrate which consists of a pad of the undersurface of this substrate body, and two or more semiconductor parts mounted on this thin film multilayer interconnection layer of this board, A pin of a large number which have joined to the above-mentioned pad of the undersurface of this board with a jointing material, have electrically connected with this semiconductor part, projected below and have been located in a line from this substrate, It has composition which has wrap thickness for a portion of a root of each above-mentioned pin, covers a portion of a root of each of this pin, and has been formed in the undersurface of the above-mentioned substrate and which has an enveloping layer made of a synthetic resin which has insulation.
[0030]The above-mentioned enveloping layer considers an invention of claim 3 as composition which is a product made of thermosetting synthetic resin.
[0031]A process to which an invention of claim 4 mounts a semiconductor part in the upper surface of a substrate, and a pin process which arranges many pins in the undersurface of this substrate, is joined to it, and is stood, It has composition which has an enveloping layer formation process which forms an enveloping layer made of a synthetic

resin which has a portion of a root of each above-mentioned pin on the undersurface of the above-mentioned substrate to which this pin was joined, and has insulation in wrap thickness.

[0032]A pin fixing process which an invention of claim 5 compares many pins with a process of mounting a semiconductor part in the upper surface of a substrate, on the undersurface of this substrate, joins it, and is stood, It has composition which has an enveloping layer formation process which forms an enveloping layer made of thermosetting synthetic resin which has a portion of a root of each above-mentioned pin on the undersurface of the above-mentioned substrate to which this pin was joined, and has insulation in wrap thickness.

[0033]An invention of claim 6 considers the above-mentioned enveloping layer formation process as direction to which flip vertical of the substrate to which the above-mentioned pin was joined was carried out, It has composition which consists of a process heated in order to dissolve a sheet which was placed with a sheet set process of making this hole fitting into a pin and placing it on the undersurface of the above-mentioned substrate, in a sheet made of thermosetting synthetic resin which has a hole corresponding to the above-mentioned pin as for the account of the upper and also to make it harden.

[0034]A process of an invention of claim 7 considering the above-mentioned enveloping layer formation process as direction to which flip vertical of the above-mentioned substrate to which the above-mentioned pin was joined was carried out, and forming a dam in the circumference of the undersurface of the above-mentioned substrate, and a process of slushing a thermosetting liquid-like synthetic resin on the undersurface of the above-mentioned substrate with which the above-mentioned dam was formed, [0035]

[Function]The enveloping layer made of a wrap synthetic resin pastes up the portion of the root of the pin of claim 1 on the peripheral surface of the root portion of a pin, and it acts so that the joining section to the substrate of a pin may be reinforced.

[0036]This acts the wax material as a jointing material to the pad of the substrate of a pin which carries out junction use so that what has low soldering intensity may be sufficient. If soldering intensity may be low, it will act so that it may also make it possible to use what has a cheap price low [brazing temperature] as wax material.

[0037]The enveloping layer made of a wrap synthetic resin pastes up the portion of the root of the pin of claim 2 on the peripheral surface of the root portion of a pin, and it acts so that the joining section to the substrate of a pin may be reinforced.

[0038]This acts the wax material as a jointing material to the pad of the substrate of a pin which carries out junction use so that what has low soldering intensity may be sufficient. If soldering intensity may be low, it will act so that it may also make it possible to use what has a cheap price low [brazing temperature] as wax material.

[0039]Compared with the enveloping layer formed with thermoplastic synthetic resin, the enveloping layer made of thermosetting synthetic resin of claim 3 is stable, and it acts so that it may continue reinforcing the joining section to the substrate of a pin stably.

[0040]The composition which has an enveloping layer formation process of claim 4 acts so that manufacture of the PGA semiconductor device with which the bonding strength to the substrate of a pin was reinforced may be realized.

[0041]The composition which has an enveloping layer formation process made of thermosetting synthetic resin of claim 5 acts so that manufacture of the PGA semiconductor device with which the fixing strength to the substrate of a pin was

reinforced may be realized.
[0042]the hole of claim 6 -- compared with the process of slushing a liquefied synthetic resin, the process of placing the sheet of a vacancy acts so that it may be sufficient in short time.
[0043]the process of slushing the liquefied synthetic resin of claim 7 has a narrow pitch of a pin -- a hole -- also when it is difficult to prepare the sheet of a vacancy, it acts so that it can apply without difficulty.
[0044]
[Example]
[The example of the PGA semiconductor device which becomes this invention] Drawing 3 shows the PGA MCM semiconductor device 30 which becomes one example of this invention. Drawing 1 expands and shows the part in drawing 2.
[0045]Identical codes are given to the component part shown in drawing 7 and drawing 8, and a corresponding portion among each figure, and the explanation is omitted.
[0046]The PGA MCM semiconductor device 30 has the substrate 11, bare chip LSI12, the lid 13, many pins 14, and the hardened coating membrane 31 made of an epoxy resin.
[0047]Generally, in an MCM semiconductor device, the composition which is a thin film multilayer interconnection board which has the additive layer 11b as a thin film multilayer interconnection layer has the indispensable substrate 11.
[0048]The pin 14 is fixed to the pad 18 by the jointing 19 made from silver paste.
[0049]The coating membrane 31 continues and exists in the approximately whole area of the undersurface 32 of the substrate 11.
[0050]The coating membrane 31 has thickness t_2 as thick as about 1 mm, about each pin 14, covered the perimeter and has covered the jointing 19 and the head 14b.
And the perimeter is covered and root portion $14a_{-1}$ of the body part 14a is surrounded.
[0051]The coating membrane 31 has the portion 34. The portion 34 had approximately annular, covered the perimeter and has covered the head 14b.
And the perimeter is covered and root portion $14a_{-1}$ of the body part 14a is surrounded.
The annular portion 34 has thickness [of about 0.5 mm] t_3.
[0052]The coating membrane 31 is pasted up on the undersurface 32 of the substrate 31.
About each pin 14, the peripheral surface of root part $14a_{-1}$ of the peripheral surface of the pad 18, the peripheral surface of the jointing 19, the head 14b undersurface, and the body part 14a is pasted strongly, respectively.
[0053]The numerals 35 show the portion pasted up on the substrate 31 of the substrate 31 of the coating membrane 31.
[0054]The numerals 36 show the portion pasted up on the pad 18 among the coating membrane 31.
[0055]The numerals 37 show the portion pasted up on the jointing 19 among the coating membrane 31.
[0056]The numerals 38 show the portion pasted up on the head 14b among the coating membrane 31. The numerals 39 show the portion pasted up on root part $14a_{-1}$ among the coating membrane 31. The covering section 31 has insulation. Therefore, between pin 14 is insulated.
[0057]Similarly, the coating membrane 31 is the hardened product made of an epoxy resin, the rate of bending flexibility is a 1,500 kgf/cm^2 grade, and its hardness is comparatively hard.

[0058]Therefore, the coating membrane 31 fixes root part $14a_{-1}$ of the body part 14a of each pin 14, and it acts so that the intensity of the adhesion to the pad 18 of the pin 14 may be reinforced.
[0059]this invention person did the examination which applies power to a Z direction and pulls the pin 14 in order to confirm the grade of reinforcement by the coating membrane 31.
[0060]Hauling power was applied, and even if the stress which acts on the jointing 19 became 10 kgf(s)/mm^2, it checked that the pin 14 could not be taken.
[0061]Therefore, in the PGA MCM semiconductor device 30 of this example, the tensile strength of the pin 14 is more than 10 kgf/mm^2, as shown in drawing 4.
[0062]From drawing 4, compared with the case where the coating membrane 31 is not formed, the bonding strength of the pin 14 is strong also about 10 times, and by forming the coating membrane 31 shows that the effect of the coating membrane 31 is large.
[0063]Reinforcement of the bonding strength of the pin 14 has the hard annular portion 34, and mainly has intensity.
The adhesion parts 38 and 39 exist and power when the pin 14 is pulled is considered to be because it to be caught by the annular portion 34.
[0064]When the bonding strength of the pin 14 carries out insertion extraction of the PGA MCM semiconductor device with a 10 kgf(s)/mm^2 grade to a socket, and when it mounts in the printed circuit board, it can fully be guaranteed that the pin 14 cannot be taken.
[0065]Therefore, the PGA MCM semiconductor device 30 of drawing 2 has the next feature.
[0066]The pin 14 is reinforced with the coating membrane 31 made of an epoxy resin and is attached also with sufficient bonding strength.
[0067]Since the jointing 19 is silver paste, it does not have a possibility that the additive layer 11a may be damaged with heat during manufacture.
[0068]Since the jointing 19 is silver paste, compared with the case where AuSn is used, its PGA MCM semiconductor device 30 is fairly cheap.
[0069]Also when it replaces with the jointing 19 made from silver paste and is considered as the soldering part made from PbSn so that drawing 4 may show, it has the same effect as the above.
[0070]The same effect is acquired also when the pin 14 is the shape which does not have the head 14a.
[0071]It replaces with silver paste and PbSn, and even if it uses a conductive binder, it has the same effect.
[0072]In this specification, the concept which includes wax material and adhesives is defined as a "jointing material." In this specification, the concept which includes adhesion and soldering is defined as "junction." Although the PGA MCM semiconductor device 10 of the above-mentioned example is the multi chip module by which two or more raise in basic wages LSI12 were mounted on the substrate 11, it can consider this invention also as the composition of the single chip package in which raise in basic wages LSI of one was mounted on the substrate.
[0073][The example of the manufacturing process of the PGA MCM semiconductor device which becomes this invention]
[The 1st example] Drawing 5 (A) thru/or (F) shows the 1st example of the method of manufacturing the PGA MCM semiconductor device 30 shown in drawing 3.

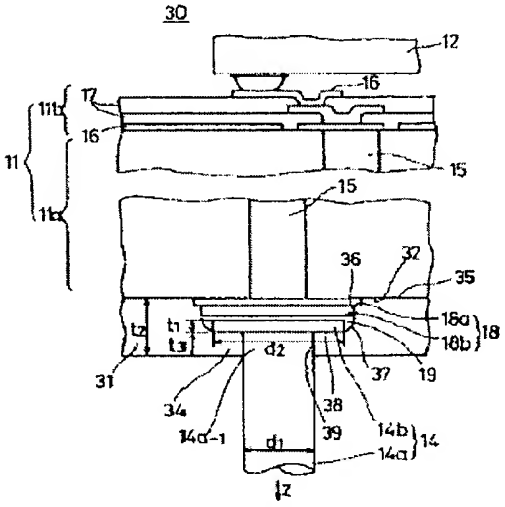
[0074]The PGA MCM semiconductor device 30 is manufactured through two or more processes shown in drawing 5 (A) thru/or (F).
[0075]Raise in basic wages LSI mounting step 50 (refer to drawing 5 (A))
On the additive layer 11b of the substrate 11 with which the additive layer 11b was formed on the substrate body 11a, two or more raise in basic wages LSI12 are mounted.
[0076]Silver paste presswork 51 (refer to drawing 5 (B))
Rear surface inversion of the substrate 11 is carried out, the silver paste of an epoxy system is printed on the pad of the substrate 11, and the silver paste film 59 is formed.
[0077]Pin connection process 52 (refer to drawing 5 (C))
The pin 14 is stuck and stood to the pad which silver paste has printed, and it heats for 60 minutes at 150 degrees C. Thereby, silver paste melts and the pin 14 is connected on the pad 18. The additive layer 11b is not damaged.
[0078]The enveloping layer formation process 53 (refer to drawing 5 (D) and (E)) made of an epoxy resin
(1) As shown in sheet set process 53_{-1} drawing 5 (D), prepare the sheet 61 made of an epoxy resin in which the hole 60 corresponding to the row of the pin 14 is opened, make the hole 60 fit into the pin 14, and lay the sheet 61 on the substrate 11.
[0079](2) heat-curing process 53_{-2} -- heat for 60 minutes at 150 degrees C in this state.
[0080]By this, the sheet 61 melts, it will be in the state where the epoxy resin which has mobility stuck to the root portion of the pin 14, an epoxy resin hardens after that, and the enveloping layer 31 is formed.
[0081]The additive layer 11b is not damaged in this process 53.
[0082] Attach the sealing process 54 lid 13 and close raise in basic wages LSI12.
[0083]The PGA semiconductor device shown in drawing 3 by the above is completed.
[0084]In the above-mentioned process 53, the work before heating is laying the sheet 61. This work is quickly done by a robot.
[0085]For this reason, the above-mentioned manufacturing method is suitable for mass production.
[0086][The 2nd example] Drawing 6 (A) thru/or (G) shows the 2nd example of the method of manufacturing the PGA MCM semiconductor device 30 shown in drawing 3.
[0087] The raise in basic wages LSI mounting step 50A, silver paste presswork 51A, pin bonding process 52A, and the sealing process 54A are the same as each processes 50, 51, 52, and 54 of the manufacturing method of the 1st example of the above.
The enveloping layer formation process 53A (refer to drawing 6 (D), (E), and (F)) made of an epoxy resin
(1) making a dam from a hyperviscous epoxy resin along with the peripheral part of the undersurface 32 (it has turned to the upper part) of the substrate 11, as shown in dam formation process $53A_{-1}$ drawing 6 (D) -- semi-hardening -- or make it harden and make the dam 70.
[0088](2) As shown in drawing 6 (E) after this [epoxy resin casting process $53A_{-2}$], slush the epoxy resin of hypoviscosity on the substrate 11, open an epoxy resin on the substrate 11, and form the film 71.
[0089](3) heat-curing process $53A_{-3}$ -- as shown in drawing 6 (F) in this state, heat for 60 minutes at 150 degree C.
[0090]Thereby, an epoxy resin hardens and the enveloping layer 31 is formed.
[0091]This manufacturing method is preferred when the pitch of the pin 14 is narrow.

[0092]
[Effect of the Invention]As explained above, according to the invention of claim 1, the bonding strength to the substrate of a pin can realize the PGA semiconductor device reinforced compared with the former.
[0093]Since the bonding strength to the substrate of a pin is reinforced, what has weak bonding strength can be used as a jointing material.
[0094]Relaxation of the demand of bonding strength will also contain the thing which has a cheap price and whose breadth of the jointing material which can be used and temperature when joining are low.
[0095]Even if it is a case where the substrate itself is the printed circuit board weak with heat BT resin type when a substrate is a thing of composition of having a weak additive layer with heat by using a jointing material with low bonding strength and, There is no possibility that these may be damaged with heat, and a PGA semiconductor device can be manufactured.
[0096]By using a jointing material with a cheap price, compared with the former, the manufacturing cost of a PGA semiconductor device is made as it is cheap.
[0097]According to the invention of claim 2, the bonding strength to the substrate of a pin can realize the PGA MCM semiconductor device reinforced compared with the former.
[0098]Since the bonding strength to the substrate of a pin is reinforced, what has weak bonding strength can be used as a jointing material.
[0099]Relaxation of the demand of bonding strength will also contain the thing which has a cheap price and whose breadth of the jointing material which can be used and temperature when joining are low.
[0100]By using a jointing material with low bonding strength, there is no possibility that a thin film multilayer interconnection layer may be damaged with heat, and a PGA semiconductor device can be manufactured.
[0101]By using a jointing material with a cheap price, compared with the former, the manufacturing cost of a PGA MCM semiconductor device is made as it is cheap.
[0102]According to the invention of claim 3, also when temperature rises, the hardness of an enveloping layer cannot change, but stabilization of reinforcement of the bonding strength to the substrate of a pin can be attained.
[0103]According to the invention of claim 4, the PGA semiconductor device with which the bonding strength to the substrate of a pin was reinforced can be manufactured.
[0104]According to the invention of claim 5, the bonding strength to the substrate of a pin can manufacture the PGA semiconductor device reinforced efficiently.
[0105]According to the invention of claim 6, an enveloping layer can be formed with sufficient performance and a PGA semiconductor device may be ****(ed) with sufficient productivity.
[0106]According to the invention of claim 7, even if the pitch of a pin is when fairly narrow, an enveloping layer can be formed without difficulty.
[Brief Description of the Drawings]
[Drawing 1]It is a figure expanding and showing the important section of the PGA semiconductor device of this invention.
[Drawing 2]It is a figure showing the fixed portion to the substrate of a pin among drawing 1.
[Drawing 3]It is a sectional view of the PGA semiconductor device which becomes one

example of this invention.
[Drawing 4]It is a figure showing brazing temperature and bonding strength.
[Drawing 5]It is a figure for explaining the manufacturing method of the PGA semiconductor device which becomes the 1st example of this invention.
[Drawing 6]It is a figure explaining the manufacturing method of the PGA semiconductor device which becomes the 2nd example of this invention.
[Drawing 7]It is a figure showing one example of the conventional PGA semiconductor device.
[Drawing 8]It is a figure expanding and showing the part in drawing 7.
[Description of Notations]
11 Substrate
11a Substrate body
11b Additive layer
12 Raise in basic wages LSI
13 Lid
14 Pin
14a Body part
14a Root portion
14b Head
15 Beer
16 The pattern made from Cu
17 Polyimide insulating layer
18 Pad
18a, 18b pad section
19 Jointing by silver paste
30 PGA MCM semiconductor device
31 Coating membrane made of an epoxy resin
32 The undersurface of a substrate
34 Annular portion
35, 36, 37, 38, and 39 Adhesion part
50 50A Raise in basic wages LSI mounting step
51 and 51A silver paste presswork
52 52A Pin bonding process
The enveloping layer formation process made of 53 and 53A epoxy resin
53_{-1} sheet set process
53_{-2} heat-curing process
$53A_{-1}$ dam formation process
$53A_{-2}$ epoxy resin casting process
$53A_{-3}$ heat-curing process
54 Sealing process
59 Silver paste film
60 Hole
61 The sheet made of an epoxy resin
70 Dam
71 Film

【図１】

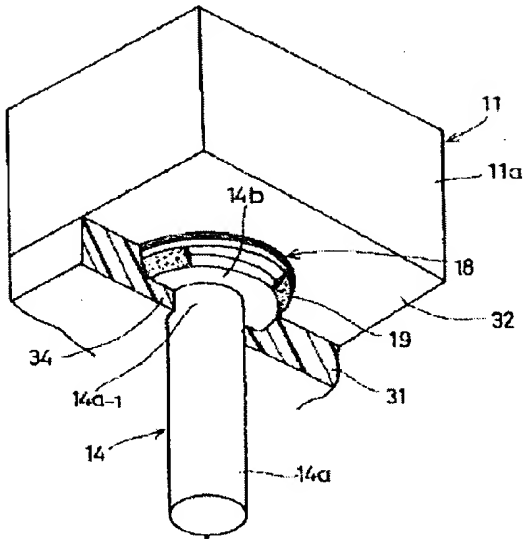
本発明のPGA型半導体装置の要部を拡大して示す図



11：基板
11a：基板本体
11b：メタライズ層
12：ペレット
14：ピン
14a：本体部
14a-1：根本部分
14b：頭部
15：ビア
16：Cu製のパターン
17：ポリイミド絶縁層
18：パッド
18a,18b：パッド部
19：銀ペーストによる接着部
31：エポキシ樹脂製の保護膜
32：基板の下面
34：湾曲部分
35,36,37,38,39：接着部分
d1：0.4mm
d2：0.7mm
t1：0.2mm
t2：1.0mm
t3：0.5mm

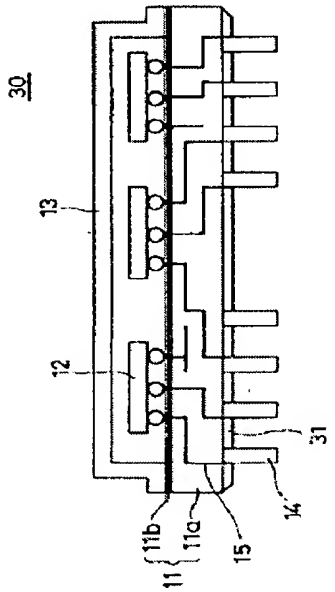
【図２】

図１中、ピンの基板への固定部分を示す図



【図３】

本発明の一実施例になるPGA型半導体装置の断面図



【図４】

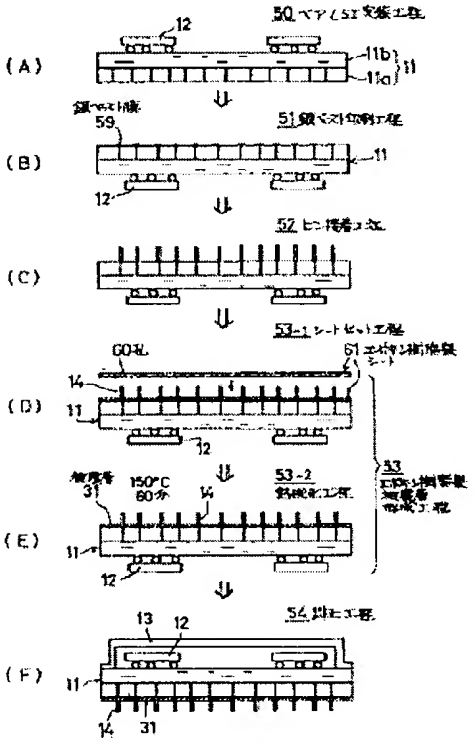
ろう付け温度及び接合強度を示す図

材料＼項目	ろう付け温度（硬化温度）（℃）	接合強度 kgf／mm²
銀ペースト	150<T₁	0．5～1．0
PbSn	180<T₁	2～3
銀ろう	650>T₁	10以上
AuSn	350>T₁	6～7
銀ペースト＋Ni-Au層	150	10以上
PbSn＋Ni-Au層	180	10以上

ポリイミドの耐熱温度T₁：約400℃

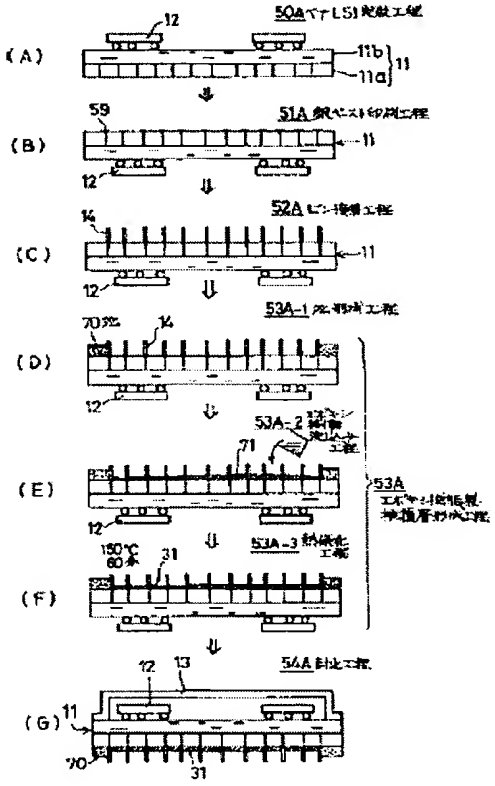
【図５】

本発明の第１実施例になるPGA型半導体装置の製造方法を説明する図



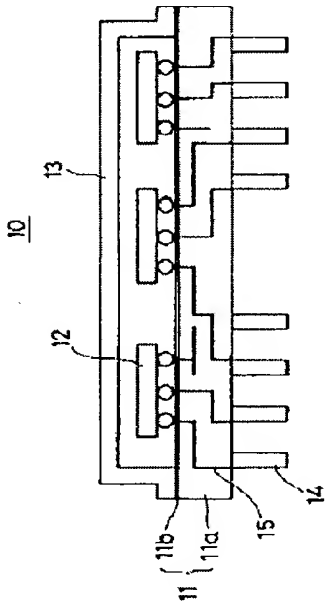
【図６】

本発明の第２実施例になるPGA型半導体装置の製造方法を説明する図



【図７】

従来のPGA型半導体装置の1例を示す図



【図８】

図７中の一部を拡大して示す図